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ABSTRACTS OF TUBERCULOSIS

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Tuberculosis of Cerebral Cortex and Atypical Course of Corresponding Meningitis.—A case of tuberculosis of the cerebral cortex and the contiguous meninges, occurring in an adult 39 years old, presented typical symptoms attributable to the localization, but led to the consideration of other conditions, mainly because of the absence of basal symptoms. Postmortem revealed the identity of the condition. Considered pathologically, there can exist, besides the typical acute exudative tuberculous meningitis, a chronic inflammation of the cerebral cortex of tuberculous origin, localizing on the convexity of the cerebral hemispheres and associated with a thickening and fibrotic involvement of the meninges. The exudative factor was insignificant and the process was designated as a *meningitis tuberculosa plastica* or *sicca*. The bacillus tended to a streptothrix morphology. Clinically, tuberculous meningitis in adults can occur with the picture of predominant involvement of the convexity of the hemispheres and without basal symptoms. Cerebral pressure symptoms can be lacking. Pulse frequency can exceed the thermic reaction. Rigidity of the neck and hyperesthesia do not necessarily belong to the picture of tuberculous meningitis. Irritation phenomena with cerebral localization can be attributed to subcortical lesions. Cheyne-Stokes breathing can occur.—*Zur Kenntnis der Tuberkulose der Hirnrinde, sowie des atypischen Verlaufes der entsprechenden Hirnhautentzündung. J. Hirschsohn Beitr. z. Klin. d. Tuberk., March, 1922, li, 38.*

Ventriculography in Tuberculous Meningitis.—Two cases are reported in which the following technique was used: A small trepan puncture (4 mm. wide trephine) is made approximately in the upper part of the frontal tuberosity, above the frontal sinus in the frontal lobe. In puncturing the ventricle the needle is introduced slanting in a medial direction. The ventricles are so often dilated that it is not difficult to enter them, and cerebrospinal fluid flows freely from the needle. By placing the patient in different positions and alternately introducing air and withdrawing fluid, the ventricle can be almost completely emptied. In roentgenographs of the head the dilated ventricles are beautifully seen. In both cases, because of a loss of fluid, it was impossible to accurately determine the ventricular pressure, but the findings warranted the belief that the pressure as a whole was about that found in the lumbar fluids. The pressure of the injected air is easily determined while being introduced with a record syringe and is maintained below the initial pressure of the fluid. It is believed that withdrawal of the ventricular fluid has no effect or only a slight effect upon the general or local symptoms. Dandy's ventriculographic method is an ideal method for determining the grade of hydrocephalus and the size of the brain ventricles. Marked differences were found between the brain ventricle and spinal fluid. While the spinal fluid in both cases revealed macroscopic and microscopic changes (ten times as many cells as normal present) the ventricular fluids in both cases were nearly normal.—*Einige Hirnventrikelpunktionen und Ventrikulographien (Dandy) bei tuberkulösen Meningitis, H. C. Jacobaeus, Beitr. z. Klin. d. Tuberk., March, 1922, l, 403.*

Polyneuritis in Pulmonary Tuberculosis.—The author studied three cases of polyneuritis or mononeuritis complicating pulmonary tuberculosis. In two there was a symmetrical affection of both peroneus and tibialis nerves, and in one an isolated paresis of the right peroneus. The causative

relationship of tuberculosis to this form of polyneuritis can hardly be questioned. The process is purely a degenerative one, in which an inflammation in the narrower sense probably does not occur. The pathological process is not restricted to the peripheral nerves, but the spinal cord is the seat of changes which exist as mild diffuse, symmetrical and system degenerations in the long fibres of the white substance determinable by the Marchi method. They can also be demonstrated as mild diffuse thickenings of the glia. The micropathology is fully described and illustrated, and tubercle bacilli are not found in the pathological areas. It is believed that the changes are occasioned by toxic influences. The changes are productive in nature, with an absence of exudates and with an involvement of mainly mesodermal elements, characterizing the condition as noninflammatory. One of the patients with a spinal and peripheral affection was in good general condition and died as a result of hemoptysis, while absolutely negative findings were noted in progressive phthisis cases with severe cachexia. Future studies will have to answer the question of whether a definite form of tuberculosis is associated with this condition or whether tuberculosis localized outside of the lungs can be combined with the same cord findings; also whether neuritides of nontuberculous origin are associated with the same spinal findings.—*Über das Vorkommen von Gliarosetten im Ruckenmark bei Lungentuberkulose, insbesondere bei der Polyneuritis der Tuberkulösen, F. Wohlwill, Beitr. z. Klin. d. Tuberk., March, 1922, l, 133.*

Lupus Erythematosus.—The etiology of lupus erythematosus has been little studied. Its inclusion among the tuberculides appears irrational because evidence is wanting as to the tuberculous nature of the lesions; the serum reaction with Besredka's antigen is only very rarely positive. The disease is rare before the age of seventeen, and is most frequent in women; cold and outdoor work favor it. It seems to belong in the category of the angioneuroses.—*Lupus érythémateux, L. Lortat-Jacob, Prog. Méd., July 1, 1922, 303.*

Tuberculosis of Endocrine Glands.—A case of disturbed function of various endocrine glands is presented. The patient first appeared with polyuria, polydipsia and glycosuria; seven years before there had been a hydrocele operation and three years before a thyroidectomy. Under treatment he became sugar-free, was given thyroid extract, which produced symptomatic improvement, and returned to hard labor. Two months later there was pleurisy pain although no physical signs of pleurisy; four months later he developed swollen, painful glands in the neck; three years later he was admitted to the hospital for severe headache and a clinical diagnosis of probable tuberculous meningitis was made. Râles were heard at the right apex, and the skin was discolored in patches. He died eight days after admission, and autopsy revealed tuberculosis of both adrenals, pancreas, thyroid, pituitary and prostate glands, right kidney (slight), right lung and meninges. Relations between gland anatomy and function are commented upon. Many of the symptoms which indicate definite diseases of various glands of internal secretion appeared in this case, which was found to have a selective tuberculosis of the glands in question.—*Selective Tuberculous Involvement of Endocrine Glands—Report of Case with Clinical and Pathological Findings, T. H. Coffen, Endocrinology, 1923, iii, 19.*

Histology of Addison's Disease.—A case of rapidly progressing Addison's disease is reported. The disease began in September with indigestion and vomiting and darkening of the skin. The patient, a man, aged 42, rapidly grew worse and death occurred in five months. In the meantine the pigmentation had become general, the blood pressure low (55 mm. of mercury) and the temperature subnormal. The blood picture was normal. A postmortem examination showed old pleural adhesions over the whole right lung, with a few scars of old healed tubercle at right apex. The right suprarenal was found small and fibrous, the left showed much more fibrosis and some areas of caseation. Microscopically, tuberculous lesions were found in both suprarenals, the cortex being greatly reduced and probably nonfunctional. No medullary tissue was found. The thyroid presented an appearance similar to that seen in colloid goitre, with very few indications of any activity. The spleen was congested and showed a much fibrosed capsule. A very few giant cells were present. The seminiferous tissue in the testis was found atrophied. There was a definite cellular, patchy degeneration in the semilunar ganglion, but no evidence of local tuberculosis or other inflammation. The pituitary was found to be more vascular than usual and had the appearance of great functional activity. The lymph nodes from the neighborhood of the suprarenal, pancreas, semilunar ganglion and portal fissure were examined. They all showed subacute inflammation, but no tubercle bacilli were found. In fact, bacilli were not demonstrated in any of these organs. Considering

the extent of the suprarenal lesion, serious symptoms were of comparatively short duration. At the time of death there was probably no functioning suprarenal tissue, and yet the patient had been at work until three weeks before this. The degeneration of cells in the sympathetic ganglia in this disease has been emphasized by others; it may perhaps be due in part to the lack of adrenalin which is necessary for the optimum functioning of the sympathetic nerve endings.—*Histological Conditions in a Case of Addison's Disease, E. E. Hewer, Brit. M. J., February 10, 1923, no. 3241, 235.*

Pseudo-Addisonian Syndrome in Tuberculous Old Alcoholics.—Two recent cases revived remembrance of similar ones and led to a search which unearthed fourteen other histories, taken in the Medical Clinic at Geneva, in which the anatomo-clinical facts were analogous. In practice a differential diagnosis may often be difficult. The points of difference and of similarity are presented in the parallel columns:

PSEUDO-ADDISON'S DISEASE OF TUBERCULOUS OLD ALCOHOLICS	ADDISON'S DISEASE
Rather old	Middle aged
Generally male	Both sexes
Alcoholism	No alcoholism
Anorexia, no abdominal pain	Anorexia, constipation, abdominal pain
Melanodermia and slate colored patches of mucous membranes	
Rapid emaciation. Extreme muscle atrophy	Slight emaciation and slight muscle atrophy
Asthenia and arterial hypotension referable to the general condition, anemia, dyspnea	Asthenia and hypotension much greater than can be accounted for by the general condition
Hepatic insufficiency	Liver normal
Rapid evolution	Slow evolution

Only two of the cases were under 40 years (37, 39). The average age of all the men was 59 and of the women 72 years. None of their histories indicated an hereditary predisposition toward tuberculosis or other notable pathological antecedents. All had vigorous constitutions which they had abused by disorderly, often vagabond, lives. It may be supposed that they had become tuberculous, not only because the opportunities for infection were frequent, but because the debility produced by long abuse of alcohol had diminished their natural resistance. In the two recent cases the suprarenals were normal and no pathological findings are recorded in the earlier cases. In the two cases the liver was hardened, but actually cirrhotic only in one; both showed fatty degeneration. There was urobilin in both urines and both gave a positive Hay's test. Hepatic insufficiency was shown in one case by alimentary glycosuria and by methylene blue and salicylate tests. Owing to his grave condition the functional capacity of the liver could not be directly determined in the other patient. There was no siderosis. The phenomena of pigmentation are to be explained, somewhat tentatively, as follows: Rapid cellular destruction, initiated by degenerations due to alcoholic abuse and reinforced by degenerative tuberculous processes, leads to the setting free of much nuclear tryosin which can neither be entirely destroyed nor eliminated by the liver. By the action of tyrosinase the excess tyrosin is transformed into melanin. This provisional hypothesis may also serve to explain the so called vagabond's pigmentation and the frequent pigmentation of the tuberculous. We may suppose in both cases that rapid destruction of cells coincides with functional insufficiency of the liver. Reasoning from the foregoing hypothesis a great many melanodermias may be explained as resulting from three phenomena, combined and active in varying degrees: 1. Excessive production of pigments by cachexia and cellular destruction. 2. Insufficient destruction and elimination of pigments by hepatic myophages. 3. Exteriorization of the pigment in the skin, due to vicarious activity of the skin or to its irritation by external causes. In this connection it is to be remembered that practitioners making use of heliotherapy state that it is the most resistant patients who become the most pigmented by the sun's rays. It may, however, be possible that these are the the only ones who can undergo a severe melanodermia without becoming cachectic. But we must admit the possible influence of varieties of pigment which have not yet been biologically differentiated.—*Le syndrome pseudo-Addisonien des vieux alcooliques tuberculeux, M. Roche, Presse Méd., August 26, 1922, xxx, 729.*

Treatment of Tuberculous Poor.—The present day treatment of tuberculosis among the working class is eminently unsatisfactory. The so called "failure of sanatorium treatment" is, doubtless, but an

inaccurate expression of this fact; inaccurate since it is well known to tuberculosis workers that the sanatorium does all that is allowed it under the circumstances, and the failure of treatment does not lie at its door. Early cases are often allowed to do themselves irreparable harm before admission to hospital or sanatorium, and during treatment active cases are allowed to exercise. It is held, therefore, that, for the patient of the working class, bed rest is indicated as soon as ever tuberculosis is suspected or detected, and that in the hospital class it should be continued, for safety, until the disease is practically arrested; with ignorant patients it is a choice, not between rest and therapeutic exercise, but between rest and uncontrolled exercise. Since pulmonary tuberculosis is a disease which takes a year or longer to cure, it is obvious that we cannot give bed rest during the whole stage of activity in institutions, and that the patient's own bed, moved into the open or near a window, is the only place where immediate and prolonged rest treatment can be carried out. A slight modification of the "class method" with intensive bed rest as advocated by Pratt, of Boston, is suggested. In England, where institutions already exist, this system could be used as a supplement. Especially bed rest at home could be arranged and supervised as soon as the disease is first suspected or detected and could be carried on some months before the patient's admission to hospital or sanatorium. These institutions could supervise the graduated return of the patient to ordinary activities. If medical opinion were aroused to adopt the "class method," it might become the useful practice of doctors to send to bed all patients suspected of having pulmonary tuberculosis pending its definite diagnosis. This would be a great step forward in the interests of all classes.—*A Plea for Changed Method in the Treatment of the Tuberculous Poor, C. Riviere, Lancet, February 3, 1923, cciv, 262.*

Treatment of Incipient Phthisis.—The available means of treating cases of phthisis in England are considered. Bodington is credited with originating the open-air treatment in 1840. Brehmer, when he established his sanatorium at Görbersdorf, in 1859, chose a site almost free from indigenous phthisis and exceptionally wind-sheltered. Spengler emphasized the wind-shelter of Davos. Dettweiler's sanatorium at Falkenstein, which was a failure, was imperfectly protected from western gales, while Walther's successful establishment at Nordrach was at the end of a sheltered valley. Walther, however, said little about this feature to his English visitors, who, returning home, sowed their sanatoriums broadcast at immense expense, and have been wondering ever since why the success they looked for has hitherto eluded them. It is intimated that the great differences in results of sanatorium treatment in England may be attributable to different locations. A patient with early phthisis should be warned to avoid the following climatic conditions: the tropics, except at certain great altitudes in wind-shelter; the immediate sea-front; a damp soil; impure or dusty atmosphere; deficient air supply; deficient sunlight; fog; and exposure to strong, prevalent winds, especially rain-bearing winds. Cases to be kept at home are those of acute miliary tuberculosis, acute tuberculous bronchopneumonia, tuberculous lobar pneumonia in its acute initial stage, and pulmonary tuberculosis supervening on any serious condition rendering home treatment desirable. Cases to be sent away are referred to an English sanatorium where, if doing well, they should stay six months or longer. The "working-class" patient may later enter an open air colony; the well-to-do should seek a locality where phthisis is uncommon. The early cases—young, vigorous, uncomplicated, with little or no fever—will do best at Davos or some other Alpine station with pure, still, dry, cold, diaphanous and diathermic air. In considering other foreign climates it is stated that Australia, New Zealand, the Cape, Canada, and the United States no longer admit cases of active tuberculosis.—*The Treatment of Incipient Phthisis, W. Gordon, Brit. M. J., March 31, 1923, no. 3248, 555.*

Physiological Effects of Mountain Climates.—The beneficial effects of mountain climates lack a satisfactory explanation. They are not, as was once thought, due to an increase in the red cells and hemoglobin, as an exclusive consequence of lowered oxygen tension. Increased radioactivity of mountain air may be thought of as a factor, in its complex effect upon metabolism. But the air at 1500 metres is only about three times as radioactive as the air of the plains, and consequently the quantity of emanations at this altitude is negligible compared with the amounts employed in therapeutic practice without demonstrable effects upon red cells or hemoglobin. Ultraviolet rays of sunlight are more abundant on high mountains, because of the dryness and cleanness of the air, but the sky at high altitude is darker and diffuses fewer refrangible waves than at lower altitudes with a dry climate. Hence, except during sun baths, the total exposure to ultraviolet rays is probably not greater in the mountains than on the plains.

The amount of water in the atmosphere diminishes as the distance above sea level increases, and this greater dryness of the air makes it easier for the body to lose heat by evaporation of sweat and of bronchial and nasal secretions. The loss of superfluous body heat takes place more rapidly in dry air and at the same time the cold of dry air is more easily borne than the cold of moist air. The importance of climatic conditions in which body heat may be readily radiated is apparent in great economic, social and hygienic movements. The location of industries and the relative cultural status of populations within a single country (France, Italy, the United States) all show that the necessity to work harder for food, shelter and clothing in the colder and dryer parts of a country is more than compensated, economically and culturally, by the increased ability to work with relative ease in the colder parts. The summer death rate of infants, exclusive of zymotic factors, furnishes instructive information concerning the noxious effects of conditions which make heat loss from the body extremely difficult. Children in their first year of life, relatively unresistant to an unfavorable environment, have a mortality rate during hot weather above the increase attributable to infected milk or other factors exclusive of heat. In terms of mechanics, climatic conditions at high altitudes increase the efficiency of the machine by facilitating the fall of temperature between boiler (liver, muscles, etc.) and condenser (respiratory mucosa and skin). As in the iron, so in the human machine the acceleration in temperature fall which increases efficiency also improves combustion and diminishes waste. In the human machine, increase in the ratio of work to the energy expended has the additional advantage that these accelerated metabolic processes may involve detoxicating factors. The therapeutic effect of high altitudes is, therefore, according to this conception, an effect of cold, a dry cold, which, without diminishing the patient's sense of well being, speeds up his metabolism and inaugurates a variety of complex processes which result in increased resistance to the activities of the tubercle bacillus.—*Le climat d'altitude et les effets physiologiques de la perte de calorique, P. O. Morhardt, Rev. d. l. Tuberc., 1922, iii, 251.*

Choice of Climate for Heliotherapy of Surgical Tuberculosis.—Heliotherapy requires for its application a location where conditions allow the sunlight to be used to advantage; to that end it is necessary for all that the temperature may permit exposure, and other factors should be adapted to the needs of particular patients. The seasonal variations alone suggest the advisability of alternation from one to another station at different times of the year, and individual reactions to climate emphasize this need. The number of hours of sunlight at the different regions where heliotherapy is employed in France are given in two-monthly figures in the following table:

Number of hours of sunshine

	JANUARY AND FEBRUARY	MARCH AND APRIL	MAY AND JUNE	JULY AND AUGUST	SEPTEMBER AND OCTOBER	NOVEMBER AND DECEMBER	TOTAL
Interior	89	159	208	234	164	71	1850
Channel	79	155	187	202	152	77	1704
Ocean	84	148	175	211	154	71	1686
Mediteranean	145	180	222	258	181	120	2216
Riviera	164	216	278	340	215	142	2710
Pau	143	168	187	257	206	110	2136
Biarritz	100	133	146	217	163	79	1691
Algeria	152	165	284	324	208	148	2575
Leysin	128	157	171	222	159	118	2011

But sunshine is not the whole of climate. Leysin with many hours of brilliant winter sunshine has many days when the temperature does not go high enough to permit exposure of patients. The Riviera, on the contrary, is so hot in summer that exposures are made during the morning and late afternoon hours, and the patients spend the middle of the day indoors with curtains drawn. Taking account only of the possibilities of using the sun as a therapeutic agent patients would be sent to:

The Riviera, from September 15 to June 15

Coast of Brittany from May to September

The Channel Coast from June to September

The mountains in winter and summer

Alternating sojourns at the sea and the mountains or at Mediterranean and North Sea stations have, besides the heliotherapeutic advantages, a favorable influence upon the patients' general health. Certain special climatic indications exist for particular forms of disease. Patients with mixed tuberculosis, and having pulmonary lesions, should not be sent to the seaside, but to the mountains or to a marine station with a very soft climate such as Archachon; lymphatic and scrofulous tuberculosis does well on the northern coasts; nervous,

neuroarthritic patients who sleep badly should be sent to the shores of the Midi and the southwest coast.—*Le choix du climat dans la cure héliothérapique des tuberculoses chirurgicales, M. Bufoni, Prog. Méd., September 9, 1922, 419.*

Résumé of X-Ray Treatment of Surgical Tuberculosis.—Roentgen treatment of tuberculosis began in 1897, when Kümmel, Freund and Schiff treated cases of lupus and Bircher rayed tuberculous peritonitis cases. In 1898 Kirmisson in Paris cured a fungoid tuberculosis of the hand in a seventeen year old youth. The same year Mühsam obtained a weakening of the infection in guinea pigs. Not until Iselin (1910) treated bone and joint tuberculosis and Kienbock (1911) rayed lymphomata was significance attached to this method. Since then a voluminous literature has appeared, which has clarified many questions, but has also left some still unsolved. Study of the method of action of roentgen rays has led to many interpretations. Only extremely large impractical doses destroy the bacilli. Neither viability nor development of bacilli is directly influenced by suitable doses. It is suggested that they produce less toxin or the toxin is destroyed by roentgen ray treatment. The possibility of their being indirectly influenced by the roentgen ray is not excluded. Even the action of X-rays on tuberculous granulation tissue is not agreed upon by all authors. Large doses seem to destroy cells of tuberculous foci, while small doses stimulate. Stephan believes small doses can stimulate the functional power of the cell. The majority of authors believe that a destruction of the tubercle should not be sought for but merely a stimulating action upon the cells. Iselin believes an autotuberculinization occurs. In favor of the nonspecific action of this treatment is its action in parts of the body. It is basically wrong to use the same treatment for glandular tuberculosis, tuberculous peritonitis, renal tuberculosis, etc. The work of Schröder is suggestive, in that healing was observed in glandular tuberculosis in rabbits whereas pulmonary tuberculosis remained uninfluenced. Roentgen treatment should be combined with general treatment. It should be only a link in the chain of conservative measures used in treating a case. Some recommend using tuberculin, but others see no value in combined treatment. Stepp uses iodine medication with the roentgen ray, and in some cases colloidal silver is used in fistulae. Bier's hyperemia is combined by Stromeyer. Sun baths, artificial light baths, inunction cures, etc., have been recommended. The dosage precautions used in cancer therapy are of value. Jüngling has constructed treatment tables for this purpose. The more severe the tuberculosis the smaller the dosage. The dangers are resorption of toxins or a hastening of destruction of the tuberculous focus or a resulting miliary dissemination. Acute skin destruction is rare with the low dosage used, but late and cumulative action is not so easily excluded, appearing as chronic indurated skin edema. The indications are best in cervical adenitis, but results are seen in tuberculous peritonitis, urogenital tuberculosis, especially bilateral kidney disease, bladder and testicular disease when operation is not feasible, bone and joint disease (best results obtained in children), etc.—*Ergebnisse oder Ubersichtsberichte. 5. Röntgenbehandlung der chirurgischen Tuberkulose, Kritische Ubersicht, O. Jüngling, Zentralbl. f. d. ges. Tuberk.- Forsch., January, 1923, xvii, 1.*

Helio-Marine Treatment of Joint Tuberculosis of Adults.—Of 171 soldiers with joint tuberculosis all received conservative treatment except when the indications for operation were distinct. The results were excellent, both in a large percentage of complete cures and a nearly complete restoration of function in many cases not absolutely cured. In the 171 cases there were 96 with a single lesion and 75 with multiple foci. In subjects with associated lesions the general condition of the patient ought to determine the question of treatment, as with them increase in the resistance to tuberculosis is of the first importance; a helio-marine cure is indicated as a means of improving the general state and increasing the organic powers of defense, even where surgical intervention will be needed to complete the cure. In regard to the question of time, which enters so largely into the choice of operative or conservative treatment for patients unable to undertake the expense of long treatment, it should be remembered that although many resections are followed by rapid healing there are also a considerable number which are followed by tenacious fistulas that can be cured only by prolonged general and climatic treatment.—*Résultats de la cure hélio-marine dans la tuberculose articulaire de l'adulte. Traitement conservateur et indications opératoires, J. Doche, Presse Méd., July 8, 1922, xxx, 579.*

Physiological Tuberculosis Treatment.—In phthisis it is necessary to combat the loss occasioned by sweating and the associated salt hunger and, finally, the gastric anacidity by administering sufficient salt, acids, raw onions and finally hydrochloric

acid. The poor appetite and failures, so often met with in tuberculosis, disappear when severe chronic cases are not being dealt with. The body can, when influenced in this way, successfully overcome tuberculosis.—*Physiologische Tuberkulosebekämpfung, E. Wilbrand, Beitr. z. Klin. d. Tuberk., March, 1922, li, 32.*

Comparison of Results of Home and Sanatorium Treatment.—Two groups of patients that had received treatment under the tuberculosis scheme of the Lancashire (England) County Council were selected for comparison. Of the 4,067 patients studied, 2,310 had completed a course of sanatorium treatment of not less than two months' duration and averaging four months, associated with dispensary supervision or treatment, and 1,757 had undergone treatment at home or in institutions other than sanatoria. As a result of the analysis of these cases, all of which were adults in the early or intermediate stage of tuberculosis when they started treatment between 1914 and 1918, it was found that those who had undergone sanatorium treatment did better in later years than the other group. Of 1,047 cases with negative or absent sputum in 1914 to 1918, it was found that 14 per cent of the sanatorium cases and 37.7 per cent of the nonsanatorium cases had died by the end of 1921. Of 1,263 cases with positive sputum, 61.2 per cent of the sanatorium cases and 81.3 per cent of the nonsanatorium cases had died by the end of 1921. With both types of treatment early diagnosis is a very important factor. Regardless of the type of treatment, patients with negative or absent sputum have the better prognosis. In the sanatorium cases the mortality from pulmonary tuberculosis is greater among patients with a positive sputum, aged between fifteen and twenty-five years, than in the other age groups.—*Sanatorium Treatment Contrasted with Home Treatment, G. L. Cox, Brit. J. Tuberc., January, 1923, xvii, 27.*

Surgery for Tuberculosis Patients.—Tuberculosis patients, particularly those with pulmonary tuberculosis, are always "substandard" surgical risks. The delicate "balance of power" existing between the disease and the resistance is easily disturbed through exposure, shock, loss of blood, undue prolongation of an unwisely chosen anesthetic, inspiration or other forms of pneumonia following anesthetics, lowered resistance and diffusion to new and previously uninfected fields, postoperative mixed infections, injudicious use of so called "drainage," or lack of a proper appreciation of the paramount importance of physiological rest. The general surgeon often fails to appreciate the limitations and precautions that must be recognized in treating these patients. Open operation and drainage of abscesses and effusions should not be employed until a differential bacteriological study is made. Patients with pulmonary tuberculosis are very susceptible to injury from certain anesthetics when badly administered over relatively long periods of time, and are quite prone to pneumonia and lung abscess from inspiration of material from the nasopharynx, and the diffusion of their own sputum into previously healthy areas of one or both lungs. Wherever and whenever possible, local infiltration anesthesia, preceded by small doses of narcotics or sedatives associated with atropine or scopolamine, are preferable to all other forms of anesthesia. Next in safety and efficiency, in selected cases, is spinal anesthesia; and after that, for operations up to the limit of one hour in duration, chemically pure sulphuric ether, preceded by small doses of morphine and atropine to prevent anxiety and resistance, to reduce the quantity of anesthetic required, and to dry the fauces and prevent inspiration of secretions. Nitrous oxide gas is not often to be employed and chloroform should never be used. Every possible precaution should be employed to prevent postoperative mixed infections and to avoid diffusion of the disease. As a means to these ends, futile attempts at "drainage" which is unnecessary and does not drain and does predispose to sinuses, fistula, hernia and delayed convalescence, should be strictly avoided. Given a tuberculous invalid with an empyema, an ischiorectal abscess, broken down or suppurating lymph nodes, a tuberculous testicle or kidney, or a peritoneal tuberculosis involving the fallopian tubes or appendix, a timely, carefully considered and dexterously done surgical operation will bring about results absolutely unattainable by other means.—*Surgery for the Tuberculous, H. G. Wetherill, J. Am. M. Ass., January 6, 1923, lxxx, 6.*

Surgical Treatment of Pulmonary Tuberculosis.—The first point is why and when cases of tuberculosis of the lungs should be treated by operative measures. There are three chief conditions or reasons for surgical interference: 1. If the state of the lung disease is such that relapse readily occurs under unfavorable circumstances and that the general condition is unfavorably affected, and immobilization is obtainable by collapse. 2. If mechanical factors prove a handicap and menace to life

and are removable. 3. If large cavitation develops and proves a menace because of risk of hemorrhage or impeded drainage of secretions. Once chronic pulmonary tuberculosis has progressed and caused a degree of fibrosis beyond what can be compensated by changes in the remaining healthy lung tissue, the disease has passed the early stages and surgical treatment must be considered. The chief postulate is that the disease must be unilateral, or, if there is disease on the opposite side, it must be neither extensive nor acutely active. Surgical treatment is indicated (1) for the treatment of the primary condition when resistance is insufficient, or conditions unfavorable, or economic necessity urgent, or the risks of infection must be controlled; (2) when mechanical factors give rise to secondary complications, bronchiectasis and cavitation; (3) when necessary to control hemorrhage; (4) when laryngeal tuberculosis is being unfavorably influenced and (5) for pneumonic tuberculosis. The most important contraindications outside the lungs are albumin or sugar in the urine, intestinal tuberculosis, advanced visceroptosis or intestinal stasis, and an extremely nervous temperament. In the following cases of fairly extensive bilateral active infection artificial pneumothorax may be attempted: 1. With very active extensive disease on one side, sufficient to render the ordinary prognosis hopeless, if there are no indications of progression or extensive secondary changes on the other side. 2. When, the collapsed lung having responded to treatment, activity develops and persists in the other lung. In such cases a partial pneumothorax, about one-third of each lung, is aimed at. The lung first treated should be allowed to reëxpand to about two-thirds of its bulk before treatment of the other is commenced. Collapse of the lung can be obtained either by intrapleural or extrapleural separation from the chest wall, or by letting the chest wall fall in with the lung. The first must always be attempted before considering the other. The complication of pleural adhesions is important. The type considered can be seen with the X-rays, stretching from lung to chest wall after partial collapse has been obtained (multiple, single, broad or firm). The commonest position is over the upper lobe, with parietal attachment in the neighborhood of the upper three ribs. Another common site is between the mesial half of the base and the diaphragm. Only the finest adhesions can be ruptured by intrapleural pressure, which should not exceed 40 mm. mercury. On rupture, the patient will feel something give way, and the operator will observe a sudden drop in pressure and increase in respiratory undulations. A single adhesion, too stout to rupture, may sometimes be stretched by a steady high pressure. Otherwise the treatment is by division, either by tenotomy through the chest wall, thoracoscopy and cauterization, or thoracotomy and exposure. The first method is used by the author; everything depends on the position of the adhesion, drawing it taut, and getting a clear view under the fluoroscope. The patient is placed with his back to the tube, and the line of approach, through the intercostal space below, is anesthetized with 2 per cent novocain. As soon as the cutting edge of the tenotome has passed into the chest, the X-rays are turned on and all other lights extinguished. The tenotome is pushed toward the adhesions and moved about till it meets the band, which is cut through by a series of sawing movements. When severed, it will be seen to drop mesially toward the mediastinum. Tautening the band facilitates cutting. Bleeding is rarely considerable and can be checked by increasing the intrapleural pressure. Pain is sometimes felt when pressure is applied, due to tension. The most likely complications are surgical emphysema, small pleural effusion, possibly hemothorax. With improper technique or under poor view, traumatic pneumothorax, hemopneumothorax, or even pyopneumothorax, results. Jacobaeus advocates division by the electric cautery. This necessitates two openings into the chest, one for the thoracoscope and one for the cautery. He can work in a narrower space but is hampered by smoke from the burning and there is difficulty in retaining the cautery at correct heat. Where adhesions are inaccessible, open operation is required, as well as where the lung has been ruptured and the hole is prevented from closing by adhesions which may be valve-like in character. Should effusion form subsequent to the operation, the patient should be so placed that it does not come in contact with the wound, or, if excessive, it should be aspirated and replaced by oxygen. In connection with the matter of adhesions, pull on the diaphragm may cause distress, pain or incessant dry, irritating cough. If these symptoms persist, either the pneumothorax must be abandoned or the diaphragm paralyzed by dividing the phrenic nerve in the neck; it must be remembered, however, that the motor fibres to the diaphragm may enter through the nerve to the subclavius muscle, in which case section of the phrenic nerve in the neck is of no avail. Extrapleural collapse of the lung is of value when the disease is localized to one upper lobe and resists treatment. Local collapse of that lobe can be obtained by displacing the lung and

parietal pleura and maintaining the displacement by paraffine wax or fat; the former may cause an extrapleural serous effusion; it should have a melting point of about 112° F. and be just hot enough to remain fluid. Collapse of both lung and chest wall is a more serious operation and the physical change is permanent. The class of case for which it is suitable is more limited, the contraindications more numerous and rigid. It is primarily of value in long-standing chronic phthisis, rather than in the acute active case. Either rib mobilization or rib resection may be performed, the latter being recently the method of choice. Rib mobilization collapse is obtained by resecting portions of the posterior ends of the first nine or ten ribs at the first stage, and of the costal cartilages of the fixed ribs with a wide section of costal margin at the second. Rib resection is done through a single vertical incision extending from the apex of the axilla to beyond the eighth or ninth rib. In addition to general anesthesia it is well to first attempt injection of each of the first nine intercostal nerves close to their angle with the ribs with 5 minims of absolute alcohol. To obtain complete collapse of the apex the first rib must be resected through a separate incision below the clavicle. The deformity of the chest is considerable but it is less visible with the clothes on.—*Surgical Treatment in Cases of Pulmonary Tuberculosis, H. M. Davies, Brit. M. J., January 27, 1923, no. 3239, 139.*

Surgical Treatment of Pulmonary Tuberculosis.—A century ago James Carson recognized that the obstacle to the healing of lung disease lay largely in the "elasticity and condition of extension" of the organ, and enunciated principles which led, after many years, to the collapse therapy which he urged and to thoracoplastic operations, as first performed by de Cerenville in 1885, Quincke in 1888, and Lucius Spengler in 1890, all designed to secure the same end. In practice, other surgical procedures wait upon artificial pneumothorax, the only possible exception being when strictly localized disease demands localized collapse. The difficulty surgery is usually called on to overcome is adherent pleura. Regarding adhesions, these are rarely entirely absent, but when the pleural surfaces adhere at only a few points or are not dense they often stretch or separate in course of time, so that an efficient pneumothorax is eventually obtained. Between this condition and closely adherent large areas of lung are a certain number of cases in which collapse is prevented by strong fleshy bands. When few and not too thick these may be successfully separated by the electrocautery or divided with a tenotome. In other cases they are best approached by an open operation, without rib resection, under gas and oxygen. They should always be severed as far away from the lung and as near the chest wall as possible. If adherent pleura entirely prevents establishing a pneumothorax, the parietal pleura can without great difficulty be stripped from the deep fascia and ribs, and the lung be allowed to collapse within the chest wall, the resultant space being filled with paraffine wax, adipose tissue or air. One must always remember that operative measures are a strain on recovery in any case of tuberculosis, that the lung collapse instead of being slowly induced, as in artificial pneumothorax, occurs immediately, with more mechanical toxic disturbance, and that once obtained it is not remediable, as in pneumothorax therapy. Great experience, particularly "pneumothorax experience," is needed in the decision, as well as good radiograms. Many authorities believe that no case of rapidly spreading or caseous tuberculosis should be submitted to chest surgery; that evidence of a healing tendency, as shown by lung retraction, must be present. As to the amount of lung collapse achieved by thoracoplasty, Brauer puts it, at the highest, at three-quarters of that obtained by artificial pneumothorax. But Dumarest considered that the apex is always less collapsed than this. Of 381 thoracoplasties performed by Sauerbruch, 35 per cent are claimed as "cures;" the postoperative mortality (immediate) was 2 per cent, and 12 per cent died during the first three weeks from aspiration pneumonia or tuberculosis of the better lung. The operative procedures covered by the term thoracoplasty include posterior rib resection, two-stage anteroposterior rib resection, partial thoracoplasty, combined thoracoplasty and pneumothorax, and combined thoracoplasty and section of the phrenic nerve. *Conclusions and Summary:* 1. Chest operations, rapidly and skilfully performed under gas and oxygen, are remarkably well tolerated by tuberculous patients. 2. Extrapleural operations are generally to be favored over intrapleural division of multiple adhesions. 3. Pneumolysis is the simplest of these operations, and by means of it collapse can be localized, but there is a real risk of sepsis, while the establishment of an extrapleural pneumothorax is difficult and not without risk, and paraffine replacement is not entirely effective. 4. For the majority of cases in which operative measures are needed for collapse and immobilization, a well devised thoracoplasty seems to offer the best results.—*Surgery in the Treatment of Pulmonary Tuberculosis, C. Riviere, Lancet, March 17, 1923, cciv, 531.*

Thoracic Surgery.—The surgery of the thorax has been greatly stimulated and advanced by the late war. It was learned that the dangers of general collapse from unilateral pneumothorax and of hemorrhage from the lung had been greatly exaggerated, and also that the disastrous effects of sepsis could be very largely avoided by operating as early as possible (always within twenty-four hours), cleaning out the pleura and excising the damaged and infected wounds of the chest wall, pleura and lung. Above all, surgeons learned the need and value of closing the parietal wound in layers to prevent secondary infection, and of completely restoring the function of the lung by the abolition, without delay, of the pneumothorax. The prevalent belief that the costly pressure chamber or intratracheal insufflation anesthesia was necessary for safe work in the major thoracic surgery was shown to be without foundation. Operations which had to be undertaken without these supposed advantages proved that the pleura could be freely opened without causing serious collapse. Operations are described for the removal of an extensive sarcoma of the chest wall, the removal of a large hydatid cyst from the lung, and the thoracic treatment of diaphragmatic hernia.—*Thoracic Surgery: War Lessons in Civil Practice, R. P. Rowlands, Lancet, January 6, 1923, cciv, 16.*

Extrapleural Thoracoplasty in Pulmonary Tuberculosis.—The operation in its present state of development was first planned by Brauer of Marburg; its technical development is mainly due to Friedrich and Sauerbruch, Friedrich performing the first operation in December, 1907. *Indications:* Extrapleural thoracoplasty belongs in the same category, in the treatment of pulmonary tuberculosis, as artificial pneumothorax which, as a rule, should first have been tried. The general indications are the same; as regards the opposite lung, demonstrable clinical findings should be absent or else of slight extent and stationary over a considerable period of observation; an X-ray examination of both lungs is essential. Intimate coöperation is demanded between the surgeon and the physician in charge of the patient, who should preferably have been observed and treated at a sanatorium prior to the operation. The physician must decide, without too long delay, when he considers continued expectant treatment or artificial pneumothorax no longer of value, and preferably before large cavities have developed, as there is no doubt that cavernous types of disease give a more unfavorable prognosis as regards permanent cure than infiltrating shrunken forms. The presence of complications is not necessarily a contraindication, but absolute contraindications are found in advanced disease of the other lung, as well as the general contraindications which militate against any serious operation. *Technique:* The resection of the ribs should proceed far beyond the diseased part of the lung; in the typical operation, resection is done from the tenth or eleventh up to and including the first rib; of the three uppermost ribs as much as possible is taken, generally 12 cm. for the third, 10 cm. for the second, and 2 to 3 cm. for the first. The ribs should be resected as far back as possible, far beyond the costal angle, right up to the costal tubercle and point of the transverse process, for the posterior parts are the stiffest and most curved parts. After reaching the level of the fourth or third rib from below, apicolysis is performed, which facilitates resection of the upper ribs. If it is difficult to collapse apical cavities by thoracoplasty alone, axillary or breast fat or muscle may be transplanted. Muscles and skin are sewed up separately and a drainage tube placed on the lower posterior angle of the wound. A tight horizontal adhesive plaster bandage to support the hemithorax is essential. The author's experience shows that a two-stage operation is less risky than one, the mortality in 54 two-stage cases being only 4 per cent, compared with about 30 per cent among 21 patients operated on in a single stage. As a rule the eleventh to sixth or fifth ribs are resected in the first stage, the remainder in the second. Two or three weeks should elapse between stages. Most of the patients have been operated on under local anesthesia but general anesthesia is often surprisingly well tolerated. *Course and After-Treatment:* The pulse rate and respirations may rise markedly at first. Immediately after operation we observe marked collapse of the thoracic wall with paradoxical respiration. Dyspnea, troublesome expectoration and radiating pains may at first be prominent. Dyspnea is partly due to "mediastinal flutter," partly to labored action of the heart. Expectoration must be relieved first by support of the operated side by the nurse and by a good compressing bandage, but especially by sufficient narcotics. The amount of sputum often diminishes very rapidly and this is a good but not infallible prognostic sign. Hyperpyrexia and rapid pulse may persist four or five days, then falling to normal; the pain likewise diminishes. The large wound almost always heals by first intention and after two or three weeks the patient can begin to sit up. The girth of the operated side may diminish as much as 10 cm., the anterior ends of the resected ribs fall down and together, and

scoliosis with convexity toward the diseased side develops. The permanent inconveniences *per se* are slight. In estimating the benefits received we must stress the diminished expectoration, disappearance of tubercle bacilli, and general condition. The physical conditions of the operated lung are difficult to determine and can be given little importance. *Summary:* Between May 1, 1914, and June 1, 1922, the author performed 75 extrapleural thoracoplastic operations for pulmonary tuberculosis, 46 being on the left side and 29 on the right. Among the left-sided cases there was one death; among the right-sided, 7. For a number of the deaths there was no obvious explanation. The immediate mortality from the operation is 10 per cent and the number of cures after three years' observation amounts to one-third. The subsequent danger lies in a new outbreak of tuberculosis in the other lung. Several later operators in Norway have performed 67 operations, with 6 deaths. An improvement in the ultimate results is not a question of early diagnosis but of early correct prognosis.—*Extrapleural Thoracoplasty in the Treatment of Pulmonary Tuberculosis, P. Bull, Brit. M. J., December 23, 1922, no. 3234, 1217.*

Separation of Adhesions by High Frequency Currents.—When adhesions prevent the collapse of a lung after pneumothorax they may, if they are small bands, be divided by the electrocoagulation. Two methods are possible: the electrode may be carried by a trocar, or a special endoscope contrived for the purpose may be used. The latter is analogous to the endoscope used for bladder work, and like it can be directed by sight. The patient sits behind the screen and the operator has constant control of the electrode. In the first successful case division was carried out in a few minutes. Immediately afterward 350 cc. of nitrogen were insufflated and the patient's condition became much improved during the next three weeks, after which a new and fatal exacerbation took place. Two other cases show improvement at the end of four weeks.—*Libération par étincelage des adhérences pleurales au cours du traitement par le pneumothorax, M. Hervé, Section d'études scientifiques de l'oeuvre de la tuberculose, May 13, 1922, reported in Rev. d. l. Tuberc., August, 1922, iii, 420.*

Separation of Pleural Adhesions by Galvanocautery.—Recovery of a collapsed lung depends on the completeness of the collapse. In the presence of bands or membranous adhesions surgical interference is contraindicated and the separation of the adhesions by galvanocautery is advised. Careful investigations of the pleural bands showed that large blood vessels are absent in bands even 1 cc. thick. Smears of the surfaces of severed ends of bands proved sterile. Experimental data show that the resistance of the pleura against staphylococcic infection is raised by long-continued pneumothorax and also by small but often repeated infections of the pleura. Experiments on the absorptive power of the pleura after intrapleural injection of fibrin, potassium iodide, methylene blue and glucose solutions proved fruitless. In the case of pleural effusions, cytological examination of the exudate should be the guide to operative procedures. Out of a series of 10 cases in which the galvanocautery was employed, 4 in which adhesions were entirely separated showed improvement clinically and by X-ray; of 4 in which adhesions were partially separated 3 showed improvement by X-ray and 1 clinical improvement. In 2 cases the separation of the adhesions by the galvanocautery was unsuccessful. Subcutaneous emphysema was often noted and serous exudate occurred in three instances.—*Die Thorakoskopie als Hilfsmittel für die endopleurale galvanokaustische Durchtrennung von Pleurasträngen, sowie für eine neue Lokalisationsmethode extrapleural anzugreifender Adhäsionen, Unverricht, Ztschr. f. Tuberk., May, 1922, xxxvi, 267.*

Operative Drainage of Tuberculous Cavity of Lung.—After briefly referring to the methods of treating pulmonary tuberculosis by pneumothorax and thoracoplastic operations, the surgical opening of cavities is considered for certain suitable cases. A single case, in which Brauer performed the operation under local anesthesia and by means of the Paquelin cautery, is then completely reported. The surgical procedure was on the basis of a diagnosis of tuberculous cavity and not lung abscess. It was also made out that dense pleural adhesions existed at the site, so that pneumothorax would be unsuitable. Thoracoplasty also could not be used, so that there remained only the possibility of surgical drainage. The idea of treating cavities surgically is not new, but the methods used have proved unserviceable. The glowing result in the case reported should be encouraging. Depending upon the site of the cavity two, three or four ribs (about 5 cm. in extent) are resected in the first phase of the operation, and two or more days later the cavity is opened by means of the thermocautery (rinsing of the cavity is contraindicated), and a heavy soft rubber drain is inserted and changed daily, to be replaced by a hard rubber or a celluloid

drain later. In time the cavity contracts and in this case only a small fistula remained, not, however, interfering with the patient's welfare. In widespread pulmonary disease or a progressive case the procedure is not recommended.—*Beitrag zur Kavernen-Eröffnung, Theys, Beitr. z. Klin. d. Tuberk., March 1, 1922, l, 388.*

Treatment of Tuberculous Pleural Exudates.—While, in nontuberculous empyema the aim is to attain complete reëxpansion of the collapsed lung, in tuberculous pleural exudates reëxpansion is not desirable. The condition of the lung is important in the latter, and only in closed tuberculosis of mild type can reëxpansion of the lung be striven for. With tuberculous exudates in a closed pleural space the acutely developing sterile pleuritis tends to spontaneous resorption in a few weeks. If pulmonary changes are slight this resorption can be aided by tapping; it is important, however, that the exudate be not completely withdrawn and be replaced with air or nitrogen. Pleural exudates, in outspoken phthisis, demand pneumothorax therapy and should be replaced with gas. Sterile tuberculous empyema is similarly treated. If this is secondarily infected, conservative means should be used. Thoracotomy with drainage gives poor results in these cases. Sauerbruch uses tampons when the case is not suitable for extensive rib resection. Spengler proposes that in such cases tapping be resorted to before operating to attain an aseptic field as far as possible. In tuberculous exudates with fistula, when there is no severe infection, thoracoplasty yields good results and leads to closure of the fistula. In less virulent infections of the pleural space, resulting from a spontaneous tuberculous pneumothorax, conservative treatment is recommended, since the exudate, by compressing the lung, can lead to closure of the fistula. In cases of tuberculous pneumothorax in which there is no exudate, one should be produced by injecting suitable irritating solutions. The exudate in artificial pneumothorax, which is seen in 50 per cent of the cases, is to be treated conservatively. Even in severe mixed infections attempts should be made, by means of tapping and pleural rinsings, to obtain results before resorting to thoracoplastic operations.—*Zur Behandlung der tuberkulösen Pleuraexsudate, L. Spengler, Beitr. z. Klin. d. Tuberk., March, 1922, l, 345.*

Technique of Pleural Puncture.—A discussion of correct procedure in paracentesis. A diagram is given of an instrument which combines the advantages of a puncture needle and a trocar. The original must be consulted for details.—*Zur Technik der Pleurapunktion, Hammer, München. med. Wchnschr., January 19, 1923, 79.*

Operative Treatment of Tuberculous Spondylitis.—The operation of Polya was performed on 6 patients with vertebral tuberculosis. In two of these death ensued from tuberculous complications within a year. Of the other 4, 3 showed excellent and 1 good convalescence. The method differs from that of Albee and Henle in that a resected part of a rib is inserted into the vertebral column. This is removed from the left side rather than the right, because a pneumothorax from operative accident would be less serious on the left side. The inner periosteum is left attached to the pleura. From two to four months after the insertion of the resected rib, patients were permitted to leave the hospital wearing a corset brace. Patients with psoas abscess or fistulas are not suitable for the operation.—*Zur operativen Behandlung der tuberkulösen Spondylitis, M. Baumann, München. med. Wchnschr., January 19, 1923, 81.*

Treatment of Tuberculosis of Nose.—The need for early diagnosis and treatment of tuberculosis of the external nares is emphasized, and attention called to the likelihood of facial lupus resulting from extension of the nasal tuberculosis. Tuberculin and the gold preparation, krysolgan, are useful medicaments, but radical surgery is the method of choice if conditions permit. When the nose is involved externally the cosmetic defect will be serious, but recourse may be had to plastic operation. The cosmetic factor will not enter into treatment of tuberculosis of the inner nose. The cartilaginous septum and turbinates may be dissected, scraped or cauterized. The hot air cautery is especially useful in the hands of one with experience, who can avoid blistering. Diathermia is applicable, but there is danger of overdosage. Spiess recommends light therapy combined with tuberculin and krysolgan. Krysolgan is given first intravenously, causing a focal reaction. The lesion is then subjected to sunlight or ultraviolet rays. Old tuberculin is then given, and at the height of the tuberculin reaction, when penetration is greatest, krysolgan is given again. After a few weeks the treatment is repeated. While the above is very effective in the treatment of lupus, it is not so successful in the inner nose. Here radium and the X-ray can be applied. No harm to skin or mucous membrane has been observed with proper dosage, and two or three treatments, separated by an interval

of a few weeks, have caused healing with scar formation. It is recommended to follow the gold treatment for some time afterward.—*Behandlung von Tuberkulose und Lupus der Nase, G. Spiess, München. med. Wchnschr., December 22, 1922, nr. 51.*

Treatment of Tuberculosis of Breast.—A woman of 38, in good general health and with an excellent personal and family history, developed two small abscesses in the outer, lower quadrant of one breast. The first swelling was noticed a month before the patient came under observation, during a slight gastric upset in which the temperature did not go above 38.5°; the swelling was then about the size of a hazel nut, hard, movable, and painless. It grew rapidly to the size of a tangerine, and then became stationary in size, but softened and adhered to the skin. At the examination a second less-developed abscess was discovered. No chest signs were found and there was no history of pulmonary or pleural disturbance. Exploratory puncture of the most advanced abscess yielded a liquid, homogeneous pus. The patient was unwilling to have any part of the breast removed which was not manifestly diseased; the affected quadrant was, therefore, extirpated in a single piece. Both abscesses contained pus; one was very superficial; the other appeared to have had a deeper origin and to have moved toward the surface. Beneath these the gland was thickened, indurated and lardaceous. The deeper tissues were studded with little yellowish nodules, varying from pinhead to lentil size; some were hard, some caseous and some completely softened. They were grouped into islets and extended to the deepest layers of the gland. Histological examination showed the characteristic lesions of a mammary tuberculosis. Five months later the operated breast showed no signs of a recurrence; the other breast was normal; no pulmonary or other suspicious symptoms existed. Tuberculosis of the breast is rare and the prognosis has been considered very grave. But a careful study of histories indicates that appropriate surgical treatment offers a good chance of cure. The conservative treatment advocated by von Eberts seems, on the contrary, indefensible. During the period of medical treatment, which in most cases is inefficacious, the patient is exposed to the risk that tuberculosis will become generalized from an organ in which surgical treatment is easy and not dangerous. Only contraindications derived from the general state forbid surgical intervention. What should be the nature of the surgical intervention? The fact that simple incision and curettage has been followed by some cures should not lead us to use upon the breast a method that has been almost entirely abandoned for other regions. There, as elsewhere, a tuberculous focus should not be touched unless it can be totally removed. Nevertheless, the opposite practice of treating a tuberculous breast like a cancerous breast, that is, removing the entire mammary and axillary gland tissue, seems not to be necessary in all cases. Tuberculous mammary lesions may, it seems, exist without corresponding axillary lesions, as was apparent in the case just described. The lesions may also be localized in the breast, and, if some which have escaped removal undergo development, there is time for a second operation. The indications for treatment may be summed up as follows: 1. In extensive, advanced pulmonary tuberculosis extensive surgical operation upon breast lesions is contraindicated. Only puncture of abscesses and curettage of fistulas is permissible. 2. In distinctly localized lesions resection of the breast may be limited to the infiltrated area. 3. Large or diffuse lesions call for amputation of the whole breast. 4. When a distinct adenopathy exists the axilla should be cleaned out whether the whole breast or only part of it be amputated.—*Sur le traitement des tuberculoses mammaires à propos d'un cas personnel, E. Chauvin, Prog. Méd., March 10, 1923, 109.*

Unilateral Immobilization of Chest in Pulmonary Tuberculosis.—Mortality records show that the greatest number of deaths from tuberculosis occurs among those having the disease in organs whose function involves movement, for example, the lungs; it is also known that this class of organs is most frequently affected. Healing occurs most often where local rest can be effected, as in joints; also in the lungs under the influence or artificial pneumothorax, postural rest or mechanical restraint. With the purpose of influencing rib movement, diaphragmatic movement, and lung movement, a device was invented which is called a "lung splint." This is shown in an illustration. By use of an adjustable combination of straps, levers and a belt, the device constricts one side of the chest, leaving the other side free. Notable features are that the limbs have free movement, there is no vital impairment of the opposite lung, and a certain amount of lateral spine movement is possible, a striking feature being that leaning to either side increases the tension of the restraining belts. The splint causes relaxation of the costosternal portion of the diaphragm, decreasing its piston action. Fixation in the position of expiration diminishes lung move-

ment. Respiratory function seems to fall mainly on the lower two-thirds of the free lung. Four case records are included, showing improvement in clinical symptoms and physical findings, attributed to the effect of the splint. Vital capacity readings were taken before and after the application of the splint, and were reduced by as much as 530 cc. in one case after splinting. Complete immobilization of the lung is not claimed, but movement would seem to be restrained to a degree approaching rest. Excision of a portion of the second rib, as an adjunct, is contemplated if necessary. Apart from slight retraction of the side splinted no untoward effect has been noted.—*"Lung Splinting" in the Treatment of Pulmonary Tuberculosis, S. H. Stewart, Brit. M. J., March 10, 1923, no. 3245, 144.*

Accidents of Chest Puncture.—Probably more than 99 per cent of the publications on gas embolism are worthless because of insufficient postmortem data. The importance of pleural reflex as a cause of sudden death following chest puncture has been exaggerated. Not all sudden deaths associated with pleural effusions are traceable to embolism; one has to consider the possibility of obstruction of a part of the arterial system by a thrombus detached during aspiration, or of edema of the lungs. It is difficult to induce an embolism in animals by introducing air into the pulmonary vessels, because these structures situated in healthy tissue collapse very readily, but in diseased tissues their rigidity may hold the vessels open. Available evidence seems to indicate that it is quite possible that air, introduced into the veins of the systemic circulation, can cause embolism of the brain, by passing through the right heart and pulmonary capillaries into the left heart and beyond. It has been shown that a fat embolism, liberated after a fracture of a bone, may follow the same course. A case of sudden death during a pneumothorax refill, as recently reported by Wolff-Eisner, is discussed, and it is pointed out that embolism was not eliminated by the data presented. Brauer believes that all such fatalities are due to gas embolism, but does not deny the possibility of minor, nonfatal disturbances being due to pleural reflex alone. Attempts to induce pleural reflex in animals by the injection of irritants have not been uniformly successful. The hypotheses put forward to explain alarming symptoms following thoracentesis include the toxic hypothesis, which concerns the absorption of drugs used in irrigating the pleural cavity and which is plausible; the hypothesis of cerebral anemia, supposedly caused by depletion of the blood supply of the brain by sudden evacuation of a pleural effusion; the hypothesis of uremia; and the reflex hypothesis. The symptoms are classified by Cordier into three groups, as follows: 1. Sudden death by syncope. 2. Onset with epileptiform convulsions, resulting in a mortality of about 60 per cent, and possibly causing cerebral disturbances of some duration among the survivors. 3. The patient develops hemiplegia and paralysis, with or without the previous occurrence of convulsions. Wever experimented with rabbits, dogs and monkeys, by injecting air or gas into the carotid artery. The animals, even after so small a dose as 1 cc. of oxygen, showed serious signs of embolism. Retinal changes following the injection of several cubic centimetres of air were noted in the form of numberless bubbles and short columns of air in the retinal arteries, a bright silvery effect being given to the retina. In about a second or two the retinal arteries were completely filled with air and the optic disc became almost white. Then, throughout the fundus, particularly in the region of the macula, there appeared numberless tiny, brightly gleaming stripes, which crossed one another in every direction, forming a delicate network. About two to three minutes after the injection, the retinal veins dilated, the air probably circulating as minute bubbles in the centre of the stream; at the same time the air disappeared from the arteries. In five minutes the appearance was again normal. Wever concluded that it is rather the localization of the embolism than the quantity of the gas which determined the gravity of the reaction and it seems to matter little what kind of gas is injected. In clinical accidents of this sort the pupils are always dilated and, if the operator is quick enough, he may observe the characteristic ophthalmological picture. In the matter of treatment, prophylaxis in the form of meticulous technique comes first. When signs of embolism appear the operation is discontinued at once. Morphine is contraindicated because of its paralytic action on the respiratory system. Artificial respiration is not attempted but, if breathing stops, rhythmic traction on the tongue should be practised, and the action of the heart reinforced by an intravenous injection of adrenalin. It is not likely that any treatment will have much effect on the patient's fate once the accident has occurred.—*Gas Embolism and Other Accidents of Chest Puncture, C. Lillingston, Tubercle, February, 1923, iv, 193.*

Sudden Death Following Thoracentesis.—Clinicians of wide experience can usually recall accidents and fatalities attend-

ing or following simple thoracic puncture. The mechanisms through which syncope, collapse and death are brought about have led to several signal investigations. Russell, in 1895, concluded that syncope attending or following thoracentesis is based upon direct injury to the vagus nerve fibres in the lung tissue with the conveyance of secondary reflex impulses to the heart. Capps has proved the existence of a true pleural reflex. He showed that the healthy pleura is tolerant to irritation, whereas the inflamed pleura may react by marked reflex circulatory disturbances. Sudden alterations in the pulmonary circulation also play a part. *Pulmonary lesions associated with trauma and congestion:* In these cases which exhibit signs of collapse or shock there has been a definite wound or laceration of the lung parenchyma or extreme pulmonary congestion has existed or has followed the thoracentesis. *Air embolism:* In 1912 Brauer directed attention to cerebral air embolism; more recently Spencer and Schlaepfer have reviewed the literature and established convincing evidence of its existence and results. *Pulmonary edema:* This phenomenon usually supervenes after drainage of the pleural cavity but may occur after simple exploration. Its etiology is unsolved. *Other pulmonary lesions:* Thrombosis, with blood clot embolism to heart or brain may follow lung puncture; also pulmonary hemorrhage, with or without hemoptysis, or albuminous expectoration. *Spontaneous pneumothorax:* This sequel is not of serious import and is rarely the cause of untoward symptoms. *Case report:* A trocar was inserted into the chest with the intention of aspirating the pleural cavity, but as no fluid came it was moved about in several directions. An abrupt change occurred in the patient, cyanosis and rigidity being followed by loss of consciousness. Shortly afterward jaw clonus was present, with dilated pupils not reacting to light. Death occurred twelve hours later. Autopsy showed a definite puncture wound in the right middle lobe, which was the seat of extensive hemorrhage, extending down to the region of one of the large branches of the pulmonary vein, but no actual rupture of its wall was discovered. The brain was not examined. It was concluded that this case fell in the group associated with pulmonary trauma and congestion and that circulatory reflexes were responsible for the outcome.—*Sudden Death Following Thoracentesis, E. S. DuBray, Amer. J. M. Sci., March, 1923, clxv, 357.*

Air Embolism or Pleural Shock.—The majority of previously reported cases of pleural shock following pneumothorax, tappings and like procedures, are due to air embolism. Examination of the eye is most important for the determination of air emboli. The pleural shock is extremely rare and very difficult to determine. The four cases reported reveal many interesting points. In primary fills and refills, air embolism can occur even without introducing gas. Alveolar air can enter an open vein or air can enter the blood from an existing pneumothorax during a refill. Prognostically, it is very important as to whether the opened vessel can collapse and thus prevent further entrance of gas into the blood; in other words, whether the vessel lies in normal or diseased tissue. In the latter case the prognosis is bad. In two cases, during a pneumotomy a vessel was opened in infiltrated tissues with a thermocautery, and the vessel did not collapse, thus resulting in a fatal embolism.—*Luftembolie oder Pleuraschock, H. L. Kowitz, Beitr. z. Klin. d. Tuberk., March, 1922, l, 374.*

Manometer in Artificial Penumothorax.—The very important matter of measuring intrapleural pressures may be done with sufficient accuracy by means of a small water manometer and any ordinary apparatus, but if one uses a large trocar the technique and apparatus devised by Kuss is to be preferred. For the induction of pneumothorax the Kuss trocar is desirable, but after the second insufflation small needles are better under ordinary conditions. Comparative determinations of intrapleural pressure were made in 30 cases with a Kuss apparatus and with an ordinary water manometer; in 22 the figures were identical, in 7 they differed by about 0.5 cm. and in 1 case by 1 cm.; the differences, then, are negligible when fine needles are used. Fine needles give less pain, are less injurious to the tissues and less likely to produce parietal emphysema. Cases in which the Kuss technique may be faulty are those where the initial intrapleural pressure is a good deal above or below atmospheric pressure. With a very wide manometer tube equilibrium is established in these cases only after a considerable quantity of gas has entered or left the pleural cavity, and the operator, after reading the small-bore manometer, must readjust the pressure in the large reservoirs as nearly as possible to the right level. This need for an approximate adjustment somewhat diminishes the accuracy of the process. The Kuss method is, nevertheless, based upon an important principle, namely, the separation of the two manometric records of intrapleural pressure and respiratory oscillations. The first of these is indispensable and the second gives information of great

importance. Bertier furnished a means of separating these two records and making it possible to read them simultaneously upon the same scale. The position of the patient ought to be considered; when the sitting position is taken after the operation, intrapleural pressure rises to an amount which may equal 3 cm. of water. This is of considerable importance when positive pressures are to be avoided, and in all cases it should be kept in mind and the insufflation stopped before the pressure that is actually desired has been registered. It is easy to measure once for all the difference between the sitting and lying pressures of a given patient, and allow for it during the whole treatment. When the production of a total pneumothorax is not urgent, insufflations of 200 to 500 cc. given every other day are enough. This slow procedure allows the sensibility of the pleura, very great at first, to diminish gradually; it avoids forcible rupture of adhesions, and through opportunity for observation of functional and radioscopic signs it allows the operator to judge at what pressure it is advisable to stop. In urgent conditions, when a total pneumothorax must be produced at once, it is prudent to terminate at a pressure slightly negative. The risks of a rise in pressure some hours after the production of pneumothorax may be annulled by using oxygen in urgent cases. An insufflation of 500 cc. of oxygen with the remainder of nitrogen will produce a sufficiently lasting collapse of the lung without risk of cardiac trouble from the development of a postoperative rise in pressure. When a curative lung collapse is desired the pressure, which should be for each patient the *requisite minimum*, ought to be maintained by insufflations made at regular intervals which may increase as resorption becomes less active. The intervals should be so gauged that not more than 500 cc. of gas will be required to obtain the optimum pressure. In the beginning this will be, for most cases, near zero, but it may frequently be considerably less than and sometimes above zero. The ideal of a constant compression ought to be realized in so far as may be. Where a total pneumothorax is prohibited by severe bilateral lesions, a relative immobilization and rest, without collapse of the lung, may be procured by a pneumothorax maintained at very low pressure. An optimum pressure does not always remain so indefinitely, and there must be rigorous radioscopic control to prevent changes in the position of organs and the cardiac and digestive troubles that may result from this. A pressure which was optimum at the beginning may have to be lowered, but it may also be desirable to increase it very considerably, and this may become possible as the pleura becomes more sclerotic and able to tolerate the high pressures which are required to maintain the lung in a constant state of collapse. Some patients do well with quarterly insufflations terminating at a pressure of +20. The patients who endure high pressures fall into two categories. There are those in whom the pleura has remained extensible; they take in large quantities of gas; without this the lung would expand. In the other type the pleura has become thickened and sclerotic; the insufflations are ineffective as regards compression of the lung which is firmly fixed and bound by adhesions. But the insufflations are needed; an empty pleural space gives rise to painful symptoms which are instantly relieved by a positive pressure in the pleural cavity. In cases of gross pachypleuritis the cavity of a pneumothorax will disappear in spite of all efforts to maintain it. But, when the pleura has remained elastic for some years and it is decided to abolish a pneumothorax, this should be done gradually by allowing the pulmonary line to reach first a third of the transverse diameter of the hemithorax; then after six months or a year, if no symptoms arise, by allowing the lung to expand to one-half or two-thirds of the diameter; and, finally, after another long interval, leaving only a small portion which will prevent contact of the lung and wall, and permitting this to disappear spontaneously when all danger seems past. When reduction of a pneumothorax is indicated, the reduction should be made under the guidance of the manometer and the screen. Once achieved, the desired pressure should be maintained under manometric control. In order to test the frequency of lung perforations in the presence of pleural effusions, twenty systematic manometric examinations were made of cases having both recent and old effusions. The apparatus of Kuss, provided with Bertier's oil manometer, was used. The initial pressure was read and gas sufficient to lower the intrapleural pressures to −8 or −10 was carefully extracted; the quantity of gas removed varied between 100 and 300 cc. After aspiration, this negative pressure was shown by the oil manometer to remain invariable in each case for at least ten minutes, after which reinsufflation was made. These studies were made upon patients having effusions of all sorts, some of them having acute symptoms which might suggest the existence of a perforation, but in every case the *persistence of a negative pressure gave evidence that the cavity of the pneumothorax was closed*. The inference from these findings is that permanent perforations

are far more rare than Bard believes; that the cough sign is not competent to demonstrate the presence of a perforation, and that the diagnosis can be made with certainty only by manometric observations. In large perforations the manometer oscillates about zero and the mean pressure is not modified either by extraction or insufflation of gas. In valvular fistulae there is, as Bard showed, a constant mean pressure above the normal value of the elasticity of the lung. Addition of gas will increase it if the valve works, but withdrawal of gas will not lower it permanently. If the fistula is immersed in the effusion it is possible to obtain a certain degree of negative pressure by aspiration of gas, but this pressure once reached cannot be increased by a further withdrawal. The evacuation of an effusion should be made under manometric control. Too rapid variations in pressure should be avoided, eitheo by allowing gas to enter the pleura so as tsmaintain a constant pressure equal to atmons pheric pressure, or by periodic insufflatior made in the course of withdrawing the pleural fluid; the former method is preferable. The ideal is to close the operation with a pressure equal to or below the pressure of one atmosphere. When it is desirable to maintain a positive pressure the trocar puncture should be allowed some days to heal, and subsequent insufflations be made with a fine needle.—*Les données manométriques au cours du pneumothorax artificiel, F. Dumarest, Rev. d. l. Tuberc., August, 1922, iii, 358.*

Artificial Pneumothorax.—Nontuberculous complications need not contraindicate artificial pneumothorax. Pneumothorax exudates are tuberculous. The pneumothorax therapy seemed to favor the propagation of the tuberculosis to other organs, while in untreated cases the disease remained limited to the lungs, in which it progressed slowly. This may be due to the fact that the formation of protective substances is interfered with, by shutting off the main disease focus (in the lungs).—*Klinische Beobachtungen in Tuberkulösen mit künstlichem Pneumothorax, I. Neuer, Beitr. z. Klin. d. Tuberk., March, 1922, l, 354.*

Artificial Pneumothorax.—During five years 312 cases were given artificial pneumothorax at Ulrici's Sanatorium. In new cases primary fills are made with carbon dioxide and then with air, while refills are given entirely with air. A spontaneous pneumothorax can often occur unbeknown. It is not rarely seen as a complication to artificial pneumothorax and is then usually associated with a purulent exudate. The author is satisfied with the result obtained when following proper indications. Even in the presence of dense total adhesions, difficult to diagnose, results were good. Pneumolysis was also used, but was difficult on account of the danger of infection, which it is believed was obviated by the introduction of 300 cc. of 0.1 per cent *Vuzinlösung*. As yet the method is not in general use.—*Über Erfahrungen beim künstlichen und natürlichen Pneumothorax, H. Grass, Beitr. z. Klin. d. Tuberk., March, 1922, li, 150.*

Artificial Pneumothorax in Tuberculosis.—The opinion is set forth that the beneficial effect of pneumothorax is primarily the rest given to a diseased lung. The rest is obtained by placing an air cushion between the lung and chest wall. The pressure of the air on the elastic lung tissue induces a collapse of the bronchial tree as well and less air can enter the respiratory passages on that side. A portable pneumothorax apparatus is described, weighing twelve pounds and containing a double manometer and a filter. A technique is described suitable for office work, but facilities for sterilization are essential and there should also be provision for roentgenological examination. There are seldom any untoward symptoms during induction, except those referable to reflex pleural irritation. Where adhesions restrict collapse, Jacobaeus has recommended thoracoscopy and the application of the electrocautery, but the method is not in use in this country. However, lung collapse need not be complete to obtain beneficial results which are the usual thing after more or less treatment. Pneumothorax is applicable in other chest conditions than tuberculosis, namely, severe bronchiectasis, lung abscess and empyema opening into a bronchus. Occasionally, however, we have very dense adhesions, which prevent satisfactory collapse. *Conclusions:* 1. The most suitable cases are one-sided tuberculosis or moderately advanced cases with proper compensatory lung tissue. 2. Cases with hemorrhages are especially benefited. 3. Bronchiectasis, lung abscess and tuberculous empyema are frequently very much improved. 4. As a diagnostic measure it offers much.—*Pneumothorax in Tuberculosis, J. J. Singer, Amer. J. M. Sci., January, 1923, cxlv, 54.*

Artificial Pneumothorax Treatment of Tuberculosis.—The discussion is based on an experience of nine and one-half years. The present tendency is to induce pneumothorax in milder cases of pulmonary tuberculosis than formerly, especially in those that are stationary or that have little disease with evidence of activity or extension.

Cases with apical involvement offer a better outlook for satisfactory compression than do cases with basal disease, because partial collapse is apt to be more effective in the former class. Cases of profuse hemorrhage give some of the most brilliant results with artificial pneumothorax. Technique has become simplified and preliminary injection of morphine is almost never necessary; occasionally, codein or aromatic spirits of ammonia is given after injection. Atmospheric air is used exclusively. At times, on entering the pleural cavity the manometer shows a marked negative reading without oscillations; this appears to be because the needle comes in contact with the visceral pleura and free oscillations are usually obtained after allowing a very small amount of air to flow in. The interval between refills is seldom longer than twenty-one days, and, as recommended by Riviere, 500 cc. or less of air are usually given; the amount should not exceed 700 or 800 cc., except in case of hemorrhage, when 1000 to 1400 cc. have been given at the first injection. As a rule the final air pressure as recorded by the water manometer need not be over + 4 cm.; in order to stretch adhesions and collapse cavities higher pressures up to 8 or 10 cm. are sometimes justified. The use of high pressures to tear adhesions is condemned. The accidents incident to artificial pneumothorax, such as pleural shock and air embolism, seem to be becoming fewer, because of better anesthetization of the field of injection, especially of the pleural membrane itself, and because manometric readings are more strictly observed and correctly interpreted. Total collapse of the lung is the exception but, fortunately, partial collapse is productive of great good. It does not effect such total disappearance of symptoms as does a complete collapse, but it will frequently do away with symptoms of toxemia. Bilateral compression, done simultaneously or successively, is not favored; it comes under the head of meddlesome interference. Effusion occurs in from 25 to 50 per cent of the cases. Small quantities of fluid do no harm, but larger amounts result in the formation of adhesions and obliteration of the pleural space. Effusions reaching the fourth rib are always aspirated and replaced with air. Involvement of the better lung, if not too extensive, does not contraindicate treatment when, without pneumothorax, the prognosis is bad. When adhesions do not interfere, a lung should ordinarily be kept collapsed for two years or longer; in cases of partial collapse refills should be continued indefinitely. In cases collapsed for hemorrhage, if the other lung is not diseased, treatment should be continued as above; if the other lung is involved, treatment is stopped when the bleeding point is firmly plugged, which from experience seems to require three or four weeks, higher pressures than ordinarily being used. Except in very early cases, lung abscess is better treated by surgery than by pneumothorax. Of 101 cases of tuberculosis treated by pneumothorax, 85 have been traced. Of these 48.2 per cent are dead, 5.8 per cent are dying, 29.4 per cent are living but incapacitated for work and 16.4 per cent are well and working. There is an aggregate of practically 30 per cent showing marked improvement and freedom from absolute invalidism. While permanent arrests are disappointingly small, pneumothorax is the one method at our command that offers to the far advanced unilateral or relatively unilateral case a good chance of further longevity and a reasonable chance of economic recovery.—*Reflections Upon Nine and One-Half Years' Experience with Artificial Pneumothorax, P. H. Ringer, N. York M. J. & Med. Rec., January 3, 1923, cxvii, 14.*

Artificial Pneumothorax Treatment of Hemoptyses.—Ten short case reports are presented to show the effect of pneumothorax in controlling hemorrhages from the lung in tuberculosis. *Summary:* 1. Artificial pneumothorax has been more effective in its control of pulmonary hemorrhage than any medical treatment. 2. It is seldom that bleeding occurs from both lungs. The side having râles most pronounced is usually the offending side. 3. Development of a hydropneumothorax without a complicating infection is not detrimental and may be desirable. 4. Febrile cases with hemorrhage can be managed to an extent that allows the patient who refuses rest treatment to be up and about. 5. One induction usually suffices. 6. Repeated attempts should be made in cases of thickened and adhesive pleura to induce an artificial pneumothorax. 7. A minimum quantity of air is all that is necessary. About 300 cc. is the maximum quantity in most cases.—*Observations on the Treatment of Pulmonary Hemorrhages by Artificial Pneumothorax, M. J. Fine, Tubercle, February, 1923, iv, 200.*

Immunological Principles Governing Artificial Pneumothorax Treatment.—On the whole, artificial pneumothorax has proved to be a beneficial procedure in the treatment of tuberculosis, but more lasting results would be obtained if principles of immunity would be more clearly recognized. These principles are considered under the

headings, local resistance to infection, general antitoxic immunity and metabolic processes. There is reason to believe that old lesions offer relatively great local resistance to infection, whereas more recent extensions are less resistant; consequently it must not be assumed that, in the collapsed lung, local resistance is immediately raised to a perfect degree but, rather, treatment must be directed toward securing healing of the most recent lesions. The general antitoxic immunity, or tolerance for toxic products, is usually proportioned to the local resistance to invasion, although there are notable exceptions. Its degree is determined by the dosage of toxic products and in far advanced active disease it is usually high. If in such a case a lung is collapsed the circulating toxins may be markedly decreased and constitutional symptoms subside; this is not due to healing of the lesions themselves, although it favors such healing. It requires some time before the antitoxic immunity becomes reduced, and in this interval a reactivation of an old lesion or development of a new one may occur without constitutional symptoms; the liberated toxins must rise above the threshold of antitoxic immunity before such symptoms are produced. We should therefore treat patients under artificial pneumothorax with reference to the pathological condition, and not according to the indications which the clinical symptoms would afford us in uncompressed cases. When a patient has suffered for a long time from the toxemia of tuberculosis, various organs are damaged and during recovery these organs tax the metabolic processes; but the most damaged tissues, that is, the most recently diseased portions of the lungs, are the last to have their demands satisfied. Consequently, a reasonably secure healing of these lesions must be attained before much bodily activity can be allowed. A complete and symmetrical pneumothorax can rarely be produced, and in uncollapsed parts it is difficult or impossible to tell accurately what is going on. Likewise, in the functioning lung the compensating hypertrophy so alters conditions that a new or a progressive lesion cannot be so readily recognized by the usual methods of physical and X-ray examination. It is wrong, therefore, to be guided entirely by signs and symptoms, and, after the establishment of a pneumothorax, to discontinue general treatment. In general, if we devote a period of about two years to treatment of the disease instead of an effort to return the patient prematurely to full participation in active life, there is every likelihood that we can restore most of the patients to a condition far better than that which they now attain. While the lung is reëxpanding the patient should be closely watched and at the slightest indication of toxemia be placed at rest. Artificial pneumothorax is not a treatment of tuberculosis but is merely an adjunct to treatment.—*Some Principles of Immunology Applied to Treatment by Artificial Pneumothorax, N. Barlow, N. York M. J. & Med. Rec., January 3, 1923, cxvii, 9.*

Phrenicotomy as an Adjunct to Artificial Pneumothorax.—Every pneumothorax, except that which gives extremely satisfactory results from the very beginning, should be combined with a radical phrenicotomy. The elevation of the diaphragm contributes in this way to the permanent collapse of the affected lung. This procedure, or even phrenicotomy alone, causes great improvement or, at times, even cures in grave cases of unilateral or predominantly unilateral pulmonary tuberculosis. It tends to produce fibrotic changes in exudative types of pulmonary tuberculosis and thus pave the way for successful internal medications or thoracoplasty.—*Die radicale Phrenicotomie als selbständiger therapeutischer Eingriff bei einseitiger Lungenphthisie, O. Goltze, Klin. Wchnschr., July 22 and 29, 1922, i, 1496 and 1544.*

Artificial Pneumothorax in Nontuberculous Lung Conditions.—Artificial pneumothorax treatment was applied in 7 cases of lung abscess, 6 of bronchiectasis, 3 of recurrent profuse hemoptysis, 2 of chronic pleural effusion and 3 of effusion complicating tumor. In abscess of the lung the success of the treatment evidently depends on the presence or absence of adhesions. When these are absent artificial pneumothorax is sufficient to effect a cure and render a severer operation unnecessary. In the cases recorded the duration of treatment was from a few months to two years. Considering the uncertainty of discovering the abscess cavity, pneumothorax is to be preferred to drainage. In two cases where the abscess was superficial the presence of adhesions led to pleural rupture, necessitating drainage and irrigation of the pleura. In one case adhesions prevented complete collapse and a thoracoplasty was necessary; this resulted in satisfactory recovery. Even so, artificial pneumothorax is advocated as a routine procedure, on the ground that it may be sufficient in itself and, where not, that the symptoms are relieved and the general condition of the patient improved, enabling him better to face the severer operation. Success in bronchiectasis depends also on adhesions; in two cases the results were disappointing

and in two no pneumothorax could be induced. In one case in which the treatment was continued for two years, the result was quite satisfactory. Failure in another case was attributed to too short a period of treatment (eight months). Two others are still under treatment and the outlook is hopeful. In two cases of hemoptysis of unknown origin, the results were entirely successful; in the third case treatment was stopped because periodical bleeding continued. In the two cases of chronic pleural effusion treatment with oxygen replacement was strikingly effective in bringing about a cure. In three cases of effusion associated with neoplasm of the mediastinum or pleura no good effects were noted. In only one instance in the whole series, a case of lung abscess, did pleural effusion appear during pneumothorax treatment, and the amount of fluid here was small.—*Artificial Pneumothorax; Its Application to Cases Other Than Those of Pulmonary Tuberculosis, J. J. Perkins and L. S. T. Burrell, Lancet, March 10, 1923, cciv, 478.*

Status of Chemotherapy in Tuberculosis.—All attempts to destroy the tuberculosis germ *in vivo* by means of antiseptic substances introduced into the blood, under the skin, or by inhalation have demonstrated that the bacilli in the tuberculous foci are not attacked. Creosote, guaiacol, thymol, formaldehyde, vapors of aromatic essences, aniline dyes, are all either destroyed, decomposed or fixed in the tissues before they reach the lesions. It is irrational to introduce, by any of these paths, substances which are endowed with no specific chemical affinity either for the bacillus or for the tuberculous cell; to do so ignores the fact that the tuberculous cell is no longer a normal one, but is a new complex, formed by a symbiotic union of the bacilli and the giant cell, a complex, living to some extent independently of the body which serves it as host, not connected with the host by blood vessels, and becoming more and more isolated as it evolves toward caseation or calcification. In these circumstances no chemical agent can be effective, unless it is sufficiently stable to resist decomposition or modification, until it can penetrate by osmosis into the protoplasm of the giant cell. Chemical substances may, however, influence the tubercles indirectly by favoring the fibrous transformation of healthy cells around foci. The salts of calcium, and perhaps also copper, act in this way, producing a dense fibrous envelope which interferes with the process of osmosis, thus isolating the tubercle and causing the degeneration and death of its constituent cells. *Calcium therapy* has given no successful results in animal experimentation, but it has apparently had some success in clinical practice. Renon claims favorable results from the use of tannate and albuminate of calcium instead of the badly-borne phosphate or carbonate. Pulmonary tuberculosis has been treated by intravenous injections of freshly prepared, sterile, filtered solutions of pure calcium chloride (30 to 1,000). If made slowly, the injections are tolerated well, and according to Bruhl and Buc, they are particularly beneficial in cavity cases. Coutiere often attested that lime pit workers are rarely phthisical, and prescribed inhalations of warm dry air saturated with quicklime dust and carbon dioxide. A calcium preparation called "colloidal" has been used at the Ayrshire Sanatorium by Prest, given hypodermically in doses of 0.5 to 1 cc. every five days. In some patients it produced vomiting and fever. The results are good in subjects with hemorrhages and tuberculous lymph nodes, but the treatment should not be given to febrile patients. The salts of *gold*, *silver* and *mercury*, very antiseptic *in vitro*, have not been useful *in vivo*. Being very unstable they are decomposed before they can pass into the tissues. DeWitt and Sherman have recently claimed that some favorable results were obtained in a series of guinea pigs treated with a double salt of methylene blue and mercuric chloride. Study of the action of *bismuth* was begun by Sauton. He found that extremely small quantities of bismuth (1 to 150,000) are able to inhibit the growth of bacteria, and that certain bismuth salts, very slightly toxic, are stable enough not to unite immediately with the tissues when introduced into the animal body. His work merits continuance. Since 1894 the action of *copper* salts upon tuberculosis has been a matter of investigation; the freedom from tuberculosis of workers in the copper industries had long been noticed. Copper salts which are very innocuous for animals are extremely toxic for algae and fungi. Certain soluble salts of copper which suffice to inhibit the growth of tubercle bacilli at 1 to 100,000 and less are, when injected into animals, transformed into insoluble salts and deposited about the point of inoculation where they produce ulceration. After intramuscular inoculation of the sulphate, acetate, oleate, albuminate, cyanide and sulphocyanide of copper, both in guinea pigs and in phthisical patients, copper has been found in the viscera but could not be detected in the lymph nodes or in tuberculous pus; in these cases the injections showed no influence on the tuberculosis. Inhalations of copper acetate are

also without effect. But in experiments made by von Linden, who injected tuberculized guinea pigs subcutaneously with cupric chloride, alone or combined with methylene blue, the tuberculous foci underwent fibrous cicatrization. She is said to have achieved the same results by inunctions with a cuprolecithin salve. Other clinicians have used the same preparation (*Kupferlecithin*) in the treatment of lupus, either by inunction or by intramuscular or intravenous injections. At the Sanatorium of Hohenhonnef, Meissen gave subcutaneous injections of 1 per cent solutions of copper chloride or of cupropotassium tartrate to phthisical patients, and in 80 per cent of his cases he observed a fall in temperature, disappearance of bacilli from the sputum and general improvement without focal reactions. The preparation called *cyanocuprol* (copper potassium cyanide plus calcium chloride) produced fibrous cicatrization of tubercles in guinea pigs, and of 63 phthisical patients in different stages of the disease who were treated with gradually increasing intravenous doses 25 were cured. This product does not act upon the bacilli, but it undoubtedly produces sclerosis. The *cerium* group of the salts of the rare earths (neodymium, praseodymium, samarium, lanthanum) inhibit the growth of tubercle bacilli in very low concentration; they diminish the fat content of the bacteria and give them a granular appearance. Clinical researches, which have been numerous, have given tolerably favorable results with intravenous injections of these salts in early tuberculosis and in cutaneous forms, but no effect on tuberculous gummata, and little manifest benefit in febrile pulmonary tuberculosis. Prolonged treatment has seemed at times to promote sclerosis. *Radioactive substances* have been studied in radium and thorium salts. These have shown no influence on the growth of tubercle bacilli *in vitro*. Tuberculized guinea pigs treated with radium sulphate or radium bromide have survived slightly longer than their controls (15 to 20 days), but in human tuberculosis no improvement has been obtained. *Arsenic* compounds may be useful by their action on general metabolism, particularly when the tuberculosis is aggravated by a concomitant syphilis, hereditary or acquired. They have no direct action on the bacilli. *Benzyl alcohol, xylol* and *other derivatives of benzol* have given some promising results in animal experimentation. Subcutaneous injections are well borne; some of them favor phagocytosis and *cumene* appears to act especially on tuberculous nodules. Inhalation of substances belonging to the *creosote series* have produced apparent amelioration in severe tuberculosis of human beings, but no favorable results have been obtained in experimental tuberculosis. *Iodine and the iodides* increase the number of leucocytes and lower the opsonic index in tuberculous guinea pigs; added to tuberculin they prevent its thermal effect. In clinical practice good results have been claimed in cases of lupus and in surgical tuberculosis; the progress of pulmonary tuberculosis has also seemed to be favorably influenced by iodine preparations. The fat stains, *Sudan III, scarlet R, nile blue, Bismarck brown*, etc., remain localized at the point of inoculation. Stains of the *benzopurpurin series* (trypan red and trypan blue) diffuse freely into the tubercles but the vitality of the bacilli remains unaffected. None of the aniline dyes has any effect upon experimental tuberculosis. *Fatty acids of chaulmoogra oil and codliver oil* seemed likely to be of use in the treatment of tuberculosis and some clinicians have described improvement obtained with chaulmoogra oil, but experiments upon guinea pigs have shown that injections of these products have no favorable influence. So far no chemical agent has been found capable of arresting experimental tuberculosis in rabbits or guinea pigs. Among the substances which have given distinctly favorable results the iodine compounds especially seem to deserve further study. The practice of haphazard injection of human beings with this or that chemical substance seems useless and may be dangerous. Only by methodical animal experimentation can the resources of chemotherapy be explored.—*Essais de chimiothérapie dans la tuberculose, A. Calmette, Rev. d. l. Tuberc., 1922, iii, 209.*

Review of Chemotherapy for Tuberculosis for 1921.—Tuberculin is not a real antigen. According to Selter and Schröder, it acts as a stimulant, causing inflammation of tuberculous tissue without being changed or bound by it in any way. Much in his latest work holds that, in the first line, the patient must be rendered insusceptible to that part of the antigen which carries the poisonous principle. As concerns increasing the allergy to the rest of the partial antigens, it is desirable but not absolutely necessary. He also believes that the antifat bodies are especially important in combating the tuberculous antigen. Langer disproves Much's statement. The therapeutic application of Much's antigen has been tried extensively and opinions vary greatly as to results. The majority of clinicians report favorable results. Selter introduced a preparation, vital tuberculin, consisting of triturated, very slightly virulent human tubercle bacilli.

A number of patients were given this preparation in doses up to 4.5 mgm. without untoward effects. Selter believes that vital tuberculin exerts an immunizing effect, but, should it fail, he states that the whole question of immunization against tuberculosis must be answered in the negative. Raw prepared a tuberculin from a human culture which was replanted 184 times and then rendered avirulent. He claims to have attained good prophylactic and curative results. The question of the tuberculin reaction being a nonspecific protein reaction has not yet been answered. Most of the workers in this field, as Friedrich and Schittenhelm, seem to ascribe some specific effects to tuberculin. Intravenous injection of glucose solution is advised, but the intravenous use of proteins is strongly warned against on account of the danger of anaphylaxis. A very extensive literature has been devoted to Friedmann's vaccine. Most workers do not find any curative or prophylactic value in it; others have seen harmful results from its use. The Tebecin of Dostal has claimed the attention of a number of investigators. It is a vaccine, consisting of tubercle bacilli liberated from their acid-fast substances by lipoid-dissolving saponins. Good results, especially in surgical tuberculosis, are claimed by all who have used it. The gold therapy of tuberculosis, chiefly with krysolgan, is winning more and more adherents. It is especially valuable in tuberculous affections of the mucous membranes. The untoward symptoms from its use are occasional exanthemata, temporary albuminuria and gastric disturbances. Copper preparations were abandoned by those who advocated its use. Cerium salt solutions were tried with supposedly good results by a number of French phthisiologists. The injections were given intravenously. Caution must be exercised in administering it to febrile patients. Dijodyl injections and injections of a mixture of cholesterin and benzyl cinnamate, especially the latter, proved almost specific in healing tuberculous foci. Chaulmoogra oil and its derivatives have been used on patients with good results. Experimental observations on guinea pigs have proved it of no value whatsoever. Codliver oil, neutralized by extraction of its free fatty acids with alcohol and afterward sterilized, has been used with good results in cold abscesses. A new method for lowering temperature in the tuberculous was introduced and applied in 168 febrile cases with good results. It consists of an intramuscular injection of 0.5 to 1.0 cc., two or three times a week, of the following mixture: Pure iodine 0.1, camphor 0.5, menthol and oil of eucalyptus AA 10, castor oil 20. Even in third stage cases pyrexia subsided in 51 per cent of the patients. A combination of this treatment and tuberculin injections is advised. Fever following tuberculin injections is easily depressed by the injection of the menthol-eucalyptus oil preparation. Intravenous injection of camphor oil (10 per cent) solution is advised. No untoward results have been noted from its administration. Its use is especially indicated in cardiac affections complicating tuberculosis. Several investigators report on the favorable action of calcium, in the form of calcium chloride injections in experimental tuberculosis in rabbits. Calcium chloride intravenously (1 to 2 gm.) influences diarrhea and vomiting very favorably.—*Über neuere Medicamente und Nährmittel zur Behandlung der Tuberkulose. Bericht über das Jahr 1921, G. Schröder, Ztschr. f. Tuberk., August, 1922, xxxvi, 435.*

Copper Treatment of Tuberculosis.—The author prepared a drug, copper-cyanyl-cyan-potassium, which he used on 24 guinea pigs. His results are not given, however.—*Contribution to the Knowledge of My Own Method of Treating Tuberculosis, T. Sugai, Tokyo Iji Shinshi, May, 1922, no. 2277, Abstract from Japan Medical World, October, 1922, ii, 296.*

Treatment of Tuberculosis with Camphor.—Camphor injections, intravenously, for their beneficial effects on the heart and the lungs, are recommended warmly in all stages of tuberculosis. In hemorrhage or spontaneous pneumothorax 5 (1 cc.) injections are given daily. In ordinary fibroid cases 4 daily injections of 1 cc. each are given at intervals of eight days. This treatment is continued for months. No contraindications to this treatment are known. The camphor injections are especially valuable in cases with hyperpyrexia and hemoptysis.—*Meine Behandlungsmethode der Lungentuberkulose mit Kampfer, B. Alexander, Deutsch. med. Wchnschr., December, 1922, xlviii, 1614.*

Red Rose-Honey Compound of Avicenna.—The medicine called *djelenjoubine* which the tenth century Arabian physician, Avicenna, prescribed for phthisical patients, is at present being submitted to laboratory and clinical tests. It consists of an extract of red roses combined with honey or a thick syrup of sugar. Tuberculized guinea pigs which have been given the extract have survived their controls and were living at the time of this announcement. A number of tuberculous women have been treated

at Boussicaut in the service of Professor Bezançon. After more than a month in which *djelenjoubine* was given by mouth, and aqueous extract of red roses was injected intramuscularly and intravenously, a certain improvement in the general state, an increase in weight, a diminution of sputum and a slight improvement in appetite had taken place. No change in the local lesions, either for better or worse, was observed. The improvement observed may perhaps be attributed to the tannin and the sugar contained in the remedy, since these substances are regarded as having a favorable influence on certain symptoms of tuberculosis. The fortunate results claimed by Avicenna may have been due to these ingredients.—*Étude expérimentale et clinique de "djelenjoubine" d'Avicenne dans le traitement de la tuberculose pulmonaire, Dinguizli, Meeting Académie de Médicine, February 6, 1923, reported in Prog. Méd., March 10, 1923, no. 10, 118.*

Chemotherapy of Tuberculosis with Sacurolin.—A compound was prepared by combining copper salts of sulpho-sodium-salicylic acid and calcium salts of sulpho-sodium-salicylic acid. The chemical formula given is $(C_7H_3SO_4Na)_2$ CuO. CaO. There are reported good results from therapeutic experiments on tuberculosis of animals.—*On the Chemotherapy of Tuberculosis by "Sacurolin" (A Preliminary Report), M. Ysudzuki, Tokyo Iji Shinshi, July, 1922, no. 2289, Abstract from Japan Medical World, November, 1922, ii, 324.*

Calcium Therapy of Pulmonary Tuberculosis.—In the early stages of the disease lime, especially if inhaled, is preventive or curative.—*Bemerkungen zur Kalktherapie bei Lungentuberkulose, R. Leuchtenberger, Beitr. z. Klin. d. Tuberk., March, 1922, l, 322.*

Treatment of Lupus Erythematoides with Krysolgan.—A report is given of 42 cases, 5 men, 36 women and one child, with lupus erythematoides. Almost all were of the chronic type, and 16.5 per cent of them had a concomitant tuberculous infection. The cutaneous and intracutaneous tuberculin reactions were positive in 36 of the cases. Krysolgan was given intravenously, beginning with 0.05 gm. and going up to 0.2 or 0.3 gm. twice a week (total amount, 1.5 gm.). Twenty-four hours after injection the lesions become intensely red, the hyperkeratotic layers begin to desquamate and, within a few weeks or several months, the lesions disappear completely, at times leaving a small pigmented area. A clinical cure was effected in 66.5 per cent of the cases and a marked improvement in 14 per cent, not influenced by the treatment 9.5 per cent, and the condition was aggravated in 9.5 per cent. Among the untoward effects were mainly exanthemata, with rise of temperature to 39°C. in one-third of the cases and stomatitis in 12 per cent. In conclusion the author states that the brilliant results from the use of krysolgan in lupus erythematoides speaks strongly for its tuberculous etiology.—*Die Behandlung des Lupus Erythematoides mit Krysolgan, H. Martensiein, Klin. Wchnsckr., November 4, 1922, i, 2235.*

Theory of Krysolgan Action.—Small foci with widespread inflammatory surrounding areas respond to krysolgan by immediate diminution of the inflammation. The central focus can react by an inflammation and at the same time the surrounding area become less and disappear. The point of attack of krysolgan is the diseased tissues and the toxins and, as a result, the symptoms disappear, in spite of the fact that treatment can be continued for months, and even when bacilli still exist. Antitoxic substances are mobilized in the body. Two phases are differentiated in krysolgan action, namely, detoxication and toxin formation, according as it affects the central bacilli or more toxic peripheral inflammatory tissue. Tuberculin produces pure toxic inflammations, which arei mmediately counteracted and limited by krysolgan; therefore, the greater tolerance for tuberculin during krysolgan treatment. That many cases of tuberculosis do not react to krysolgan is explained by the peculiarity of the reacting tissues.—*Zur Theorie der Krysolgan-Wirkung, E. Levy, Beitr. z. Klin. d. Tuberk., April, 1922, li, 171.*

Vaccine Treatment in Pulmonary Tuberculosis.—There are certain types of cases in which secondary infection of clinical importance can be recognized and which will respond to autogenous vaccine treatment. These are usually found among the cases that "hang fire" under sanatorium conditions. The type of case amenable to vaccine treatment can usually be recognized by the following features in common: (1) old-standing lesions, (2) periodical and sudden fever attacks with short duration and apparent recovery, (3) extensive lesions with cavitation, (4) streptococci usually the predominant microörganism in the sputum and (5) fever attacks usually controlled or lessened by autogenous streptococcus vaccine. Sudden pyrexia in an afebrile case, if due to tuberculous infection, can usually be con-

nected with some definite indiscretion or with an extension of disease capable of recognition by physical examination. In the favorable type mentioned the pyrexia never coincided with any increased exercise or other cause, and no gross alteration in the condition of the lung lesions was noted during these attacks. Bacteriological examination of sputum was done according to a method described by Wordley in the *Journal of Hygiene* for July, 1921. In this method the sputum is reduced to a powder by drying on unglazed porcelain tiles and the powder is then planted on suitable media. The micro-organisms found were streptococci, staphylococci, and Micrococcus catarrhalis. The streptococci were considered to be of most importance and appeared to be mainly of two types, long chains of coarse cocci and short chains of fine cocci. Except in a very few cases they proved to be nonhemolytic and were nonpathogenic for guinea pigs. The vaccines usually consisted of streptococci or streptococci plus one of the others. With heated vaccines the dosage ranged from 5 to 50 million, injections being given every five to seven days for three to four months, wherever possible. With vaccines killed by formalin much larger doses were used, ranging from 50 to 1000 million. The ordinary sanatorium routine treatment was not modified during the vaccine treatment. Of 11 cases with secondary infection and with fever 10 were improved by autogenous vaccine treatment. Ten other cases now showing definite attacks of pyrexia were given vaccines with no favorable result.—*An Investigation of Secondary Infections Complicating Pulmonary Tuberculosis among Sanatorium Patients, R. C. Wingfield, Lancet, January 13, 1923, cciv, 67.*

Petruschky's Tuberculin Liniment.—To test the effectiveness of Petruschky's liniment the author selected a number of patients in the various stages and forms of tuberculosis and treated them with the liniment, in doses up to twenty times the largest employed by Petruschky. No focal or systemic reaction or improvement was observed in any case. The same liniment was applied to tuberculous guinea pigs and no influence whatsoever was noticed on the course of the disease.—*Das Linimentum tuberculini comp. Petruschky, H. Ulrici, Klin. Wchnschr., January 1, 1923, ii, 20.*

Harm from Tuberculin.—Harm often results after tuberculin injections, from failure to observe the principles of sensitization. A case in point is the report of Neustadt and Stadelmann, who gave tuberculin in increasing doses of 1, 3, 5, 7 and 9 mgm. in six to twelve-day intervals, until fever reaction ensued. This is a dangerous error; it has long been known that repeated injections of the same dose in just these time intervals, causing no fever at first, may ultimately lead to serious consequences and delay healing.—*Ueber Tuberkulinschädigung, F. Hamburger, München. med. Wchnschr., January 26, 1923, 119.*

Treatment with Vital Tuberculin.—Vital tuberculin (Selter) consists of ground up human tubercle bacilli, the bacterial protoplasm, in which the bacillary substances are present in vital form. The tuberculin is tolerated better than corresponding doses of unground living bacilli; doses less than 0.1 mgm. produce no general reaction, while doses over 1 mgm. produce local reactions. The tuberculin is prepared in four series, beginning with 0.001 mgm. Ten cases of pulmonary tuberculosis in various stages were treated. One case is excluded for other reasons, one was undoubtedly improved, while the remainder showed no improvement. It is concluded that this preparation hardly possesses advantages over the other tuberculins.—*Ein Beitrag zur Behandlung mit dem Vital-Tuberkulin "Selter," H. H. Meiners, Beitr. z. Klin. d. Tuberk., March, 1922, li, 58.*

Tebelon Treatment of Tuberculosis.—Stoeltzner was the first to inject waxes to produce specific antibodies which would destroy the waxy capsule of the tubercle bacillus. The substance he injected was an isobutyl ester of a fatty acid which he called *tebelon*. The indications for this treatment are childhood tuberculosis, lymphatic, skin and bone tuberculosis, preferably those in the subacute stage. The author reports a series of 18 cases with favorable results. Pleurisy with effusion subsided, the fluid disappearing, and scrofuloderma healed completely. Only one case of spina ventosa did not yield to this treatment.—*Zur Behandlung der Tuberkuloseinfection mit Tebelon, C. Schaefer, Deutsch. med. Wchnschr., October, 1922, xlviii, 1380.*